

CLAIMS

1 1. An incubator for use in a clinical analyzer, said incubator
2 comprising:

3 an incubator housing;

4 at least one load station for accommodating at least one test sample;

5 a read station, said read station being disposed within said incubator
6 housing;

7 first drive means for driving at least one of test sample and said load
8 station in a first direction, said at least one load station having at least two
9 load positions arranged in a second direction, said second direction being
10 substantially orthogonal to said first direction; and

11 second drive means for selectively driving one of said at least one said
12 load station and said at least one test sample accommodated therein in said
13 second direction relative to said read station for reading said at least one test
14 sample.

1 2. An incubator as recited in Claim 1, including a ring assembly
2 having a plurality of circumferentially disposed load stations.

1 3. An incubator as recited in Claim 2, wherein said ring assembly
2 includes at least two concentric ring components, each of said ring components
3 being supported for rotation about a central axis of said incubator housing.

1 4. An incubator as recited in Claim 3, wherein said first drive
2 means includes means for driving said rotatably driving said ring assembly
3 about said central axis.

1 5. An incubator as recited in Claim 4, wherein said second drive
2 means includes means for selectively radially moving said at least one test
3 sample relative to said central axis from at least one load position.

1 6. An incubator as recited in Claim 5, wherein said second drive
2 means includes means for radially moving said at least one test sample
3 between at least a first load position and a second load position of a load
4 station.

1 7. An incubator as recited in Claim 6, wherein said read station is
2 disposed in relation to one of said ring components, such that said first drive
3 means can rotate one load position of each of said load stations into a read
4 position, said second drive means enabling at least one other load position of
5 at least one of said load stations to be selectively moved into the read position.

1 8. An incubator as recited in Claim 7, including a dump station
2 radially adjacent said read station.

1 9. An incubator as recited in Claim 1, wherein said read station
2 includes a device capable of detecting an optical property of a test sample.

1 10. An incubator as recited in Claim 9, wherein said device is a
2 reflectometer.

1 11. An incubator as recited in Claim 4, including third drive means
2 for selectively and radially removing at least one test sample from a load station
3 of said ring assembly for later reinsertion therein.

1 12. An incubator as recited in Claim 1, wherein said read station
2 includes a device capable of measuring an electrical property of a test sample.

1 13. An incubator as recited in Claim 12, wherein said device is an
2 electrometer.

1 14. An incubator as recited in Claim 1, including a plurality of slide

2 elements, each said slide element having a volume of a test sample metered
3 thereupon.

1 15. An incubator as recited in Claim 6, including shuttle means for
2 radially shuttling test samples into said incubator housing.

1 16. An incubator as recited in Claim 15, wherein said shuttle
2 means is circumferentially disposed immediately adjacent said second drive
3 means.

1 17. An incubator as recited in Claim 15, wherein said shuttle
2 means includes a reciprocating pusher blade disposed in relation to said
3 incubator housing to shuttle at least one test sample into at least one load
4 position of a load station.

1 18. An incubator as recited in Claim 15, wherein said shuttle
2 means is capable of shuttling at least two radially disposed test elements into
3 a load station simultaneously.

1 19. An incubator as recited in Claim 15, including a supply of
2 stacked slide elements, said shuttle means being disposed adjacent to slide
3 element supply.

1 20. An incubator as recited in Claim 3, wherein said first drive
2 means includes a belt drive wrapped about the periphery of at least one ring
3 component.

1 21. An incubator as recited in Claim 3, wherein said ring components
2 of said ring assembly are independently driven relative to one another by said
3 second drive means.

1 22. An incubator as recited in Claim 4, wherein at least two load
2 positions of a load station differ in height relative to one another.

1 23. An incubator for use in a clinical analyzer, said incubator
2 comprising:

3 an incubator ring assembly supported for rotation about an axle defining
4 an axis of rotation, said ring assembly including a plurality of circumferentially
5 defined load stations, each said load station having at least two load adjacent
6 radial load positions for receiving test samples;

7 at least one read station for reading at least one test sample at a read
8 position:

9 first drive means operatively connected to said incubator ring assembly
10 for rotating said ring assembly about said axis of rotation, said at least one said
11 read station being disposed such that a first plurality of circumferentially
12 disposed load positions can be selectively aligned with said read position; and

13 second drive means for radially moving a test sample from at least one
14 load position of a load station into the read position.

1 24. An incubator as recited in Claim 23, wherein said second drive
2 means includes shuttle means for shuttling at least one test sample into a load
3 station of said incubator ring assembly.

1 25. An incubator as recited in Claim 24, wherein said shuttle
2 means can selectively shuttle at least two radially adjacent test samples into
3 said incubator ring assembly simultaneously.

1 26. An incubator as recited in Claim 23, wherein at least one test
2 station includes a device capable of measuring an optical property of a test
3 sample.

1 27. An incubator as recited in Claim 26, wherein said device is a
2 reflectometer.

1 28. An incubator as recited in Claim 23, including means for
2 independently controlling the temperature and humidity of each test sample
3 loaded into said incubator ring assembly.

1 29. An incubator as recited in Claim 28, wherein said independent
2 temperature and humidity control means includes a slide cap disposed at each
3 load position.

1 30. An incubator as recited in Claim 23, wherein at least one test
2 station includes a device capable of measuring an electrical property of a test
3 sample.

1 31. An incubator as recited in Claim 30, wherein said device is an
2 electrometer.

1 32. An incubator as recited in Claim 23, including third drive means
2 for selectively removing at least one test sample from said incubator ring
3 assembly for subsequent reinsertion therein.

1 33. An incubator as recited in Claim 20, wherein said incubator ring
2 assembly includes at least two concentric rings, each of said concentric rings
3 being coupled to said first drive means.

1 34. An incubator as recited in Claim 27, wherein said reflectometer is
2 disposed in relation to the load positions of an inner ring of said incubator ring
3 assembly.

1 35. An incubator as recited in Claim 31, wherein said electrometer is
2 disposed in relation to the load positions of an outer ring of said incubator ring
3 assembly.

1 36. An incubator as recited in Claim 23, wherein adjacent radial load
2 positions of at least one load station differ in height relative to one another.

1 37. An incubator as recited in Claim 24, including a dump station
2 radially disposed in relation to said read station.

1 38. An incubator as recited in Claim 37, wherein said second drive
2 means transfer fresh test samples into empty load positions of said incubator
3 after test samples have been dumped.

1 39. A clinical analyzer comprising:
2 an analyzer housing; and
3 an incubator disposed within said analyzer housing, said incubator
4 including:
5 at least one load station for accommodating at least one test sample;
6 at least one read station;
7 first drive means for driving at least one of said at least one test sample
8 and said load station in a first direction, said at least one load station having
9 at least two load positions arranged in a second direction, said second direction
10 being substantially orthogonal to said first direction; and second drive means
11 for selectively driving at least one of said load positions and said at least one
12 test sample accommodated therein with respect to said read station for testing
13 said at least one test sample.

1 40. A clinical analyzer as recited in Claim 39, wherein said
2 incubator includes a ring assembly including at least two concentric rings,
3 each of said rings being supported for rotation about a primary axis, said first
4 drive means including means for rotating said incubator ring assembly and in
5 which each ring includes a plurality of circumferentially disposed load
6 positions.

1 41. A clinical analyzer as recited in Claim 40, wherein said second
2 drive means includes first shuttle means for radially shuttling at least one test
3 sample between radial load positions of said incubator ring assembly.

1 42. A clinical analyzer as recited in Claim 39, including a dump
2 station radially adjacent at least one read station.

1 43. A clinical analyzer as recited in Claim 41, wherein said first
2 shuttle means can selectively shuttle a test sample after said test sample has
3 been read at said read station.

1 44. A clinical analyzer as recited in Claim 41, including second
2 shuttle means for shuttling at least one test sample into a load station of said
3 incubator ring assembly.

1 45. A clinical analyzer as recited in Claim 44, wherein said second
2 shuttle means can selectively shuttle at least two test samples into a load
3 station of said incubator simultaneously.

1 46. A clinical analyzer as recited in Claim 44, including a slide
2 supply for supplying slide elements to said incubator, said slide supply being
3 operatively connected to said second shuttle means.

1 47. A clinical analyzer as recited in Claim 46, including metering
2 means for dispensing a volume of a test sample onto at least one slide element
3 prior to shuttling said slide element into said incubator.

1 48. A clinical analyzer as recited in Claim 47, wherein said metering
2 means is disposed in relation to said slide supply so as to meter a volume of
3 test sample onto a slide element to be shuttled by said second shuttle means
4 into a load position of a load station within said incubator.

1 49. A clinical analyzer as recited in Claim 40, including means for
2 selectively removing at least one test sample from said incubator, said clinical
3 analyzer further including wash means for washing said at least one selectively
4 removed test sample, said incubator further including means for loading said
5 at least one washed test sample back into said incubator ring assembly.

1 50. A clinical analyzer as recited in Claim 39, wherein said at least
2 one read station includes a device capable of measuring an optical property of
3 a test sample.

1 51. A clinical analyzer as recited in Claim 50, wherein said device is
2 a reflectometer.

1 52. A clinical analyzer as recited in Claim 39, wherein said at least
2 one read station includes a device capable of measuring an electrical property
3 of a test sample.

1 53. A clinical analyzer as recited in Claim 52, wherein said device is
2 an electrometer.

1 54. A method of incubating and reading test samples for a clinical
2 analyzer, said incubator comprising at least one load station for
3 accommodating at least one test sample and a read station disposed within an
4 incubator housing, the method comprising the steps of:

5 driving at least one of test sample and said load station in a first
6 direction, said at least one load station having at least two load positions
7 arranged in a second direction, said second direction being substantially
8 orthogonal to said first direction; and

9 selectively driving at least one said load station and said at least one test
10 sample accommodated therein in the second direction to locate at least one test
11 sample relative to said read station for testing said at least one test sample.

12 55. A method as recited in Claim 54, in which said incubator
13 includes a ring assembly, said ring assembly including at least two concentric
14 ring components defining a plurality of circumferentially disposed load stations
15 wherein the first driving step includes the step of rotating said ring assembly
16 about a central axis.

17 56. A method as recited in Claim 55, including the steps of:
18 reading a first test sample which has been rotated into alignment with said
19 read station;

20 radially driving an adjacent second test sample into alignment
21 with said read station; and

22 reading said second test sample.

23 57. A method as recited in Claim 56, including the step of dumping
24 each of said test samples from said ring assembly after said reading steps.

25 58. A method as recited in Claim 57, including the step of loading
26 new test samples into said load station after said dumping step.

1 59. A method as recited in Claim 58, wherein said loading step
2 includes the step of simultaneously radially shuttling at least two test samples
3 into said load station.

FILED " 20 " SEP 20 2020